

## REMARKS

### 1. Status of the Claims

Claims 1, 4, 5, 8-21, 24 and 27-35 stand pending. Claims 2-3, 6-7, 22-23, and 25-26 stand canceled. Claims 1, 4, 5, 15-18, 21, 24, 27 and 29-35 stand rejected. Claims 8-14, 19-20, and 28 are withdrawn.

In this response, no claim is amended, canceled, or added. Therefore, claims 1, 4, 5, 8-21, 24, and 27-35 remain pending with claims 8-14, 19-20 and 28 withdrawn.

### 2. Rejection of the Claims Under 35 U.S.C. § 103(a)

Claims 1, 4, 5, 15-18, 21, 24, 27 and 29-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 11-290094, English translation, to Kuniaki, et al. (hereafter “*Kuniaki*”) and JP-11-290094, English translation, to Yukihiisa et al. (hereafter “*Yukihiisa*”) and Kleinig, Univ. Heidelberg, 1967, abstract (hereafter “*Kleinig*”). The Office alleges that *Kuniaki* discloses esterification of astaxanthin by esterifying the hydroxyl groups with fatty acids. Specifically, *Kuniaki* discloses astaxanthin dipalmitoyl ester in Examples 1 and 2 and astaxanthin dicaproyl ester in Example 3. The Office admits that *Kuniaki* at least fails to disclose forming C8 to C10 fatty acid monoesters and using those monoesters in food or cosmetic compositions. See, e.g., p. 4, para. 12 of the Office Action dated 9/2/09. The Office appears to rely on *Yukihiisa* for allegedly disclosing astaxanthin fatty acid monoesters used in food and cosmetics. The Office further cites *Kleinig* for allegedly disclosing esterifying astaxanthin with myristic (C14), lauric (C12), and capric (C10) acids. From these references, the Office alleges that one of ordinary skill in the art would reasonably expect that the method of esterification taught in *Yukihiisa* could be used to form astaxanthin C8 to C10 fatty acid monoesters.

Applicants respectfully traverse the rejection. As admitted by the Office, none of the cited references disclose astaxanthin C8 to C10 fatty acid monoesters as recited in claims 1, 21, 27, 33, 34, or 35. *Kuniaki* discloses only astaxanthin fatty acid diesters. *Kleinig* is silent as to whether the esterified astaxanthin are monoesters or diesters. Therefore, the Office has

attempted to rely on *Yukihisa* for teaching monoesters. However, *Yukihisa* only discloses formation of esters with long-chain (C14 and greater) fatty acids, as opposed to the medium chain fatty acids (C8 to C10) recited in the claims. There is no evidence or reasoning provided to evince that astaxanthin medium chain fatty acid monoesters would have been expected to be formed using the methods described in *Yukihisa*. Additionally, there is no evidence that the methods of *Kuniaki* and *Kleinig* could have formed monoesters. This leaves the Office relying solely on the conclusion that an astaxanthin long-chain (C14 or greater) fatty acid monoester disclosed in *Yukihisa* and/or astaxanthin long-chain (C16 or greater) or short-chain (C6 or less) fatty acid diesters disclosed in *Kuniaki* have structures similar enough to the claimed astaxanthin medium chain (C8 to C10) fatty acid monoesters to be *prima facie* obvious. However, when discussing fatty acids, persons of ordinary skill in the art typically group the fatty acids into long-chain, medium-chain, and short-chain. These groups are delineated at least because each group is expected to have differing properties. The Office has provided no evidence or reasoning to support the conclusion that astaxanthin esterified with fatty acids from each different groupings would perform similarly.

In addition to the Office providing no evidence of the similarity of properties between the alleged similar structures and the claimed esters, the Specification provides evidence that the references do not disclose a suitably operative, obvious process for making the claimed astaxanthin medium chain fatty acid monoester. The absence of a known or obvious process for making the claimed compounds overcomes a presumption that the compounds are obvious that is based on the close relationships between their structures and those of prior art compounds. *In Re Hoeksema*, 399 F.2d 269, 274-75, 158 U.S.P.Q. 597, 601 (C.C.P.A. 1968). Only *Yukihisa* discloses any production of astaxanthin fatty acid monoesters. However, *Yukihisa* discloses only esters of long chain fatty acids (C14 or greater). Further, as demonstrated by Applicants, the method of production disclosed in *Yukihisa* cannot be used to produce astaxanthin medium chain fatty acid monoesters as claimed.

Specifically, *Yukihisa* discloses a method of producing the esters that uses a low water content of 200 ppm to 1000 ppm, which is equivalent to 0.02% to 0.1%. *See, e.g.*, p. 13, paragraph 18. Further, *Yukihisa* discloses that the reaction is a reversible equilibrium reaction

which generates water, and that water is a factor that inhibits the reaction. *See, e.g.*, p. 13, paragraph 18. However, when medium-chain fatty acid is used instead of a long chain fatty acid in the method using only 0.02 to 0.1% water, esterification is not sufficiently carried out. *See, e.g.*, p. 8, ll. 5-12 and Table 1 of the Specification. In contrast to the method of *Yukihisa*, Applicants discovered that to form astaxanthin medium-chain fatty acid monoesters, several percent of water is added to the reaction system. *See, e.g.*, p. 8, ll. 13-16 and Table 1 of the Specification. Therefore, *Yukihisa* fails to disclose a method that could produce the claimed astaxanthin medium-chain fatty acid monoester. Further, *Yukihisa* specifically teaches away from increasing the water content, at least by disclosing that increased water content would inhibit the reaction. Thus, a method of producing astaxanthin medium-chain fatty acid monoesters would not have been obvious from *Yukihisa*. At least because, neither *Kuniaki* nor *Kleinig* disclose monoesters, and none of the references including *Yukihisa* disclose a suitably operative, obvious process for making the claimed composition, no *prima facie* case of obviousness has been established.

Dependent claims 4, 5, 15-18, 24, and 28-32 depend from claims 1, 21, or 27, respectively, and are also not obvious for at least reasons similar to those for claims 1, 21, and 27. For at least these reasons the rejection should be withdrawn. Further note that withdrawn claims 8-14 also depend from claim 1. Claims 8-14 are also not obvious for at least reasons similar to claim 1, and thus should be rejoined when claim 1 is found allowable.

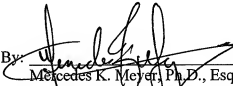
**CONCLUSION**

Should the Examiner have any questions or comments regarding Applicants' amendments or response, she is asked to contact Applicants' undersigned representative at (202) 842-8821. Please direct all correspondence to the below-listed address.

In the event that the Office believes that there are fees outstanding in the above-referenced matter and for purposes of maintaining pendency of the application, including for Notice of Appeal, the Office is authorized to charge the outstanding fees to Deposit Account No. 50-0573 and treat this paper as a Notice of Appeal. The Office is likewise authorized to credit any overpayment to the same Deposit Account Number.

Respectfully submitted,  
DRINKER, BIDDLE & REATH LLP

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By:   
Mercedes K. Meyer, Ph.D., Esq.  
Registration No. 44,939

Customer No. 055694  
Drinker Biddle & Reath LLP  
1500 K Street, N.W., Suite 1100  
Washington, D.C. 20005-1209  
T: 202-842-8821  
F: 202-842-8465